California Energy Commission

STAFF REPORT

LOCALIZED HEALTH IMPACTS REPORT

For Selected Projects Awarded Funding Through the Alternative and Renewable Fuel and Vehicle Technology Program Under Solicitation PON-14-602 – Biofuels Early and Precommercial Technology Development

CALIFORNIA
ENERGY COMMISSION
Edmund G. Brown Jr., Governor

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ABSTRACT

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). This statute, amended by Assembly Bill 109 (Núñez, Chapter 313, Statutes of 2008), authorizes the California Energy Commission to "develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies." Assembly Bill 8 (Perea, Chapter 401, Statutes of 2013) reauthorizes the ARFVTP through January 1, 2024.

AB 118 also directs the California Air Resources Board (ARB) to develop guidelines to ensure air quality improvements. The ARB Air Quality Improvement Program (AQIP) Guidelines, approved in 2008, are published in the *California Code of Regulations, Title 13, Motor Vehicles, Chapter 8.1, AB 118 Air Quality Guidelines for the Alternative and Renewable Fuel and Vehicle Technology Program and the AQIP*. The *AQIP Guidelines* require the Energy Commission, as the funding agency, to analyze the localized health impacts of ARFVTP-funded projects that require a permit (13 CCR § 2343). As provided by 13 CCR § 2343, this *Localized Health Impacts Report* is required to be available for public comment for 30 days prior to the approval of projects.

This *Localized Health Impacts Report* analyzes the combined impacts in the communities, including exposure to air contaminants or localized air contaminants, or both, and including, but not limited to, communities of minority populations or low-income populations, as declared by the biofuels early and pre-commercial technology proposers or as determined by Energy Commission staff. Appendix A, Localized Health Impact Report Assessment Method, describes the analysis used for this *Localized Health Impacts Report.*

Keywords: Air pollution**,** air quality, Air Quality Improvement Program (AQIP), California Air Resources Board (ARB), alternative fuel, Assembly Bill (AB) 118, California Environmental Quality Act (CEQA), emissions, demographics, environmental justice (EJ) indicators, Environmental Justice Screening Method (EJSM), greenhouse gas emissions (GHG), localized health impact (LHI)

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EXECUTIVE SUMMARY

Under the *California Code of Regulations Title 13, (CCR § 2343),* this *Localized Health Impacts Report* describes the alternative fuel demonstration projects proposed for Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) funding that may or may not require a conditional or discretionary permit or environmental review, such as conditional use permits, air quality permits, wastewater permits, hazardous waste disposal permits, and other land-use entitlements. This report does not include a project that requires only residential building permits, mechanical/electrical permits, or fire/workplace safety permits, as these are determined to have no likely impact on health or environment.

The California Energy Commission is required to assess the localized health impacts of the projects proposed for ARFVTP funding. This *Localized Health Impacts Report* focuses on the potential impacts a project may or may not have on a particular community, particularly those communities that are considered especially vulnerable to emissions increases. For high-risk communities, this report assesses the impacts from criteria emissions/air toxics and the air quality attainment status.

Environmental justice communities, low-income communities, and minority communities are considered to be the most impacted by any project that could result in increased criteria and toxic air pollutants within an area because these communities typically have the most significant exposure to the emissions. Assessing projects and the communities surrounding them is important because of the health risks associated with these pollutants. Preventing health issues from air pollution in any community is important, but it is especially important to minimize any negative impacts in communities that are already considered to be at risk due to their continued exposure to these contaminants.

The projects in this *Localized Health Impacts Report* are assessed for potential health impacts for the communities in which they will be located. Based on this analysis, it is not anticipated that implementation of the projects will have negative impacts because there will not be a net increase in criteria and toxic emissions, specifically in those communities that are considered most vulnerable. Potentially, the projects stand to provide improved quality of life through cleaner air.

CHAPTER 1:
Project Proposed for Funding

On October 27, 2014, the California Energy Commission released a competitive Grant Solicitation Program Opportunity Notice (PON)-14-602, titled "Biofuels Early and Pre-Commercial Technology Development," under the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). This grant solicitation was an offer to fund projects that emphasized transformative technology solutions to significant biofuels industry problems that increase yields, productivity, or cost-effectiveness of biofuel production, and/or that target a significant unmet need in California's biofuels industry.

On June 24, 2015, the Energy Commission posted the Notice of Proposed Awards (NOPA) for PON-14-602, resulting in four projects proposed for funding. This *Localized Health Impact Report* assesses and reports on the potential localized health impacts of the proposed projects with public review and comment for a 30-day period.

This chapter summarizes the projects proposed for Energy Commission funding. Table 1 provides the company, project name, project address, and environmental justice indicators. (See Appendix A.)

Table 1: Proposed Projects for Biofuels Early and Precommercial Technology Development With Environmental Justice (EJ) Indicators

Applicant	Project Name	Project Address	EJ Indicator(s)
Altex Technologies Corporation	Biomass Conversion to Synthetic Gasoline System (BCSGS)	244 Sobrante Way, Sunnyvale, California 94088-4807	Minority
San Diego State University Research Foundation	Energy-Efficient and Cost-Effective Microalgae Disruption for Extraction of Lipids for Biodiesel Production	San Diego State University, 5500 Campanile Drive, San Diego, California 92182	None
University of California, Davis; Regents of the University of California	Improving Microalgae Feedstock for Biofuel Production Using CO_2 and Waste Nutrients From Anaerobic Digesters	University of California Davis, One Shields Avenue, Davis, California 95616	Poverty
		CleanWorld 28068 County Road 98, Davis, California 95616	
West Biofuels, LLC	Production of Advanced Renewable Fuel Ethanol and Value-Added Chemicals From Biomass Residues	Woodland Biomass Research Center 14958 County Road 100B, Woodland, California 95776	Minority and Unemployment

Source: California Energy Commission staff analysis

Altex Technologies Corporation

Project Name: Biomass Conversion to Synthetic Gasoline System (BCSGS)

The goal of this project is to develop a technically and economically feasible BCSGS system that will produce gasoline from cellulosic biomass at less than $2 per gallon with carbon intensity[1] of less than 30. This goal will be achieved by operating a 1 barrel/day BCSGS system and producing drop in gasoline and using the test system data to upgrade the design of a 2000 ton/day BCSGS plant and define the fuel cost and the carbon footprint of the fuel.

The project will require only modified operation of the existing Altex testing facility and equipment and a temporary system setup, on site. No permanent construction or other potential environmental-impacting activities will be required.

Project-Generated Emissions

Based on the operation of one commercial-scale plant with a capacity of 11 million gallons of gasoline (10 million gallons of diesel equivalent), the total greenhouse gas (GHG) emissions from using the fuel in transportation vehicles using conventional gasoline will be 10,936 tons/year. Replacing the same amount of gasoline with BCSGS fuel in the transport vehicles, the GHG emission will be 3,645.5 tons/year, which is 66.7 percent less compared to the baseline.

The preliminary economic analysis has shown that a plant having a processing capacity of 2,000 tons of biomass residue per day with a gasoline production capacity of 50 million gallons of gasoline per year is economically feasible. Assuming that 48 million tons/year of agriculture residues and forestry residues are potentially available in California and 4,032 million gallons of synthetic gasoline is produced in the future, the total greenhouse reduction in California will be 26.5 million tons annually. Hence, adopting BCSGS technology for production of drop-in biofuels has the potential to attain the targeted carbon intensity without a significant problem.

In addition, synthetic gasoline production using BCSGS can become carbon-negative[2]. In addition to gasoline, the BCSGS generates large quantities of fuel gas, char, and heavy oil. These are energy-dense products that can be used to provide heat within the BCSGS, within the process industry, and for other purposes. The hydrocarbons present in the synthetic gasoline and other products produced from the BCSGS process are from the carbon sources present in the plants, which were produced through photosynthesis using carbon present in the atmosphere. However, careful collection methods for locally available biomass and distribution and use of synthetic gasoline within the production area have to be selected to achieve a negative carbon footprint. This project will achieve this carbon-negative status with careful selection of the location of a commercial-scale biofuel plant and an appropriate synthetic-gasoline-distribution network.

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1 Carbon intensity is the amount of carbon by weight emitted per unit of energy consumed.
2 Carbon negative is used to describe any activity that removes more carbon CO2 from the atmosphere than you are responsible for creating.

The proposed site is within a mile of 8 schools, 10 day care centers, and 9 medical offices/hospitals.

San Diego State University Research Foundation

Project Name: Energy-Efficient and Cost-Effective Microalgae Disruption for Extraction of Lipids for Biodiesel Production

This project seeks to develop an energy-efficient and cost-effective microalgae cell disruption process for enhancing lipids yield, hence increasing algal biodiesel yield. The proposed process is original and transformative, and it uses elemental copper and copper sulfate as agents for disrupting the cell walls, releasing the lipids or oils contained inside the cell wall. There is no teaching, suggestion, or motivation for using copper or copper sulfate as agents for disrupting microalgal cell, making the proposed research novel and unique.

Project-Generated Emissions

The algal biomass (feedstock) for the project will be grown in the above-mentioned laboratories, and therefore, the project does not involve feedstock transportation. Furthermore, the project will focus on the enhancement of algal lipids extraction and feedstock for biodiesel production, and it will not generate biodiesel as part of the scope of work.

The project proposer states that the project will not cause direct physical change in the environment or a foreseeable indirect physical change in the environment because all the project activities will be performed in controlled environments, such as a laboratory setting.

The proposed site is within a mile of six schools, five day care centers, and five medical offices/hospitals.

University of California, Davis; Regents of the University of California

Project Name: Improving Microalgae Feedstock for Biofuel Production Using CO_2 and Waste Nutrients From Anaerobic Digesters

This project seeks to improve production of microalgae-based biofuels (biodiesel and biomethane) based on lower cost and improved environmental performance. The project proposer will divert the waste by-products from anaerobic waste digesters, including water, nutrients, and carbon dioxide, to grow microalgae producing glycerol-based lipids that will be converted to biodiesel via a transesterification reaction. The project proposer will use improved methods and technologies for microalgae cultivation, harvesting, and processing, such as infrared (IR) drying, to develop an integrated anaerobic digester (AD) and microalgae system for coproduction of biodiesel and biomethane from organic waste. The demonstration project will document the benefits in cost and energy savings using AD effluent and IR drying technology on a commercial scale.

Project-Generated Emissions

The project proposer states that the project will not cause direct physical change in the environment or a foreseeable indirect physical change in the environment because all the project activities will be performed in controlled environments; such as a laboratory setting.

Site 1

The site at University California, Davis, One Shields Avenue, Davis, California 95616, is within a mile of 10 schools, 8 day care centers, and 7 medical offices/hospitals.

Site 2

The site at CleanWorld, 28068 County Road 98, Davis, California 95616, is within a mile of a school and a day care center.

West Biofuels, LLC

Project Name: Production of Advanced Renewable Fuels Ethanol and Value-Added Chemicals From Biomass Residues

This project combines a commercially proven thermochemical process for converting biomass residues to syngas with a commercial catalyst to develop and validate, at pilot-scale, a synthesis process to convert the syngas to mixed alcohols. This project builds upon bench-scale demonstrations to validate performance with a pilot-scale gasification system in Woodland, California. The synthesis uses a mixed alcohol synthesis catalyst and recycles the methanol fraction of the syngas through the catalyst to optimize the production of fuel ethanol and other larger-chain alcohols to be marketed as renewable chemicals. This process has the potential to be a cost-effective substitute or supplement to the nearly 1.28 billion gallons of imported corn ethanol used in California gasoline annually. This advanced renewable ethanol would be generated from residue biomass feedstock from California's agriculture and forest management, resulting in a significant reduction in carbon intensity over corn ethanol and conventional ethanol or gasoline.

Project-Generated Emissions

The project proposer will provide a quantified description of the air emissions (criteria and toxic) directly associated with project operations, including, but not limited to 1) transport (truck or rail) of fuel, feedstock, or other material to project site as required for operations and production; 2) production of fuel or technology components; 3) fueling of alternatively fueled vehicles; 4) potential increases to traffic.

The proposed project will use a slipstream of syngas from the existing, operating, and permitted gasifier. There are no additional environmental impacts or emissions by adding this project.

There are no schools, day care centers, or medical offices/hospitals within a mile of the proposed project site.

CHAPTER 2:
Approach

The *Localized Health Impact Report* (*LHI Report*) assessment method in Appendix A assesses communities potentially impacted by air pollution and possibly benefitting by biofuel technology development. The California Air Resources Board's (ARB) *Proposed Screening Method for Low-Income Communities Highly Impacted by Air Pollution for Assembly Bill (AB) 32 Assessments* is also used to integrate data to identify low-income communities that are highly impacted by air pollution.[3] Other resources used in this assessment are the *California Infrastructure State Implementation Plans*, [4] which contain publicly noticed air quality attainment plans, and the *Green Book Nonattainment Areas for Criteria Pollutants*[5].

For this *LHI Report*, the Energy Commission interprets "permits" to connote discretionary and conditional use permits because they require a review of potential impacts to a community and the environment before issuance. Since ministerial-level permits, such as building permits, do not assess public health-related pollutants, the Energy Commission staff does not assess projects requiring only ministerial-level permits in this report.

The cities where the projects will be located are all in nonattainment zones for ozone, PM[6] 2.5, and PM 10. Table 1 shows the EJ indicators for the four projects in four cities, that is, minority populations, low incomes, and highly sensitive groups based on age (individuals younger than 5 years of age and older than 65 years of age). Table 2 shows the demographics for Davis, San Diego, Sunnyvale, and Woodland. Woodland has minority and unemployment EJ indicators, and is classified a high-risk community, according to the Environmental Justice Screening Method (EJSM).

Staff collected information about predicted emissions from the project proposals. Activities conducted are not expected to have any negligible impact on emissions. The projects will not cause direct physical change in the environment or a foreseeable indirect physical change in the environment because all the project activities will be performed in controlled environments, such as a laboratory setting.

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3 California Air Resources Board, *Proposed Screening Method for Low-Income Communities Highly Impacted by Air Pollution, 2010* (Sacramento, California).

4 http://www.arb.ca.gov/planning/sip/sip.htm.

5 http://www.epa.gov/oaqps001/greenbk.

6 "Particulate matter" is unburned fuel particles that form smoke or soot and stick to lung tissue when inhaled, and a chief component of exhaust emissions from heavy-duty diesel engines.

CHAPTER 3:
Summary

If funded, the "Biofuels Early and Pre-Commercial Technology Development" projects will result in developing cutting-edge technologies that achieve both energy and climate change goals. The projects will emphasize transformative technology solutions to significant biofuels industry problems the increase yields, productivity, or cost-effectiveness of biofuel production.

The anticipated impacts to the community where the project would be located are positive in terms of air quality and anticipated greenhouse gas reductions.

As indicated in Table 1, with further detail in Table 2, Woodland is the only high-risk community, as identified in Appendix A. The anticipated benefit from the proposed projects for the people in all the communities, especially the disadvantaged communities, is highly likely, if not certain, to be positive.

CHAPTER 4:
Acronyms

Air Quality Improvement Program (AQIP)
Air Resources Board (ARB)
Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)
Anaerobic digester (AD)
Assembly Bill (AB)
Biomass Conversion to Synthetic Gasoline System (BCSGS)
California Code of Regulations (CCR)
California Environmental Quality Act (CEQA)
Carbon dioxide (CO_2)
Environmental justice (EJ)
Environmental justice screening method (EJSM)
Greenhouse gas (GHG)
Infrared (IR)
Localized health impact (LHI)
Notice of Proposed Awards (NOPA)
Particulate matter (PM)
Program Opportunity Notice (PON)
State Implementation Plan (SIP)

Table 2: Environmental Justice (EJ) Indicators Compared With California

Yellow highlighted areas indicate numbers (percentages) that meet the definition for EJ indicators.

	Number of EJ Indicators	Below Poverty Level (2009-2013)	Black Persons (2010)	American Indian and/or Alaska Native (2010)	Asian and/or Pacific Islander (2010)	Persons of Hispanic or Latino Origin (2010)	Persons Under 5 Years of Age (2010)	Persons Over 65 Years of Age (2010)	Unemployment Rate (June 2015)
California		**15.9%**	**6.2%**	**1.0%**	**13.0%**	**37.6%**	**6.8%**	**11.4%**	**6.3%**
		>15.9%	**>30%**	**>30%**	**>30%**	**>30%**	**>8.16%**	**>13.8%**	**>6.3%**
Davis	1	26.3%	2.3%	0.5%	21.9%	12.5%	3.7%	8.5%	4.6%
San Diego	0	15.6%	6.7%	0.6%	15.9%	28.8%	6.2%	10.7%	4.7%
Sunnyvale	1	8.1%	2.0%	0.5%	40.9%	18.9%	8.0%	11.2%	3.6%
Woodland	2	12.7%	1.5%	1.3%	6.2%	47.4%	7.9%	10.9%	6.4%

Sources: Unemployment information from the State of California, Employee Development Department (EDD) Labor Market Information Division: http://www.labormarketinfo.edd.ca.gov/Content.asp?pageid=133 and Age / ethnicity demographics, U.S. Department of Census: http://quickfacts.census.gov

APPENDIX A:
Localized Health Impact Report Assessment Method

Based on the California Energy Commission's interpretation of the *California ARB* AQIP *Guidelines*, this *LHI Report* assesses the potential impacts to communities as a result of the projects proposed by the ARFVTP. This report is prepared under the *California ARB AQIP Guidelines, California Code of Regulations, Title 13, Motor Vehicles, Chapter 8.1 (CCR § 2343)*:

"(6) Localized health impacts must be considered when selecting projects for funding. The funding agency must consider environmental justice consistent with state law and complete the following:

> (A) For each fiscal year, the funding agency must publish a staff report for review and comment by the public at least 30 calendar days prior to approval of projects. The report must analyze the aggregate locations of the funded projects, analyze the impacts in communities with the most significant exposure to air contaminants or localized air contaminants, or both, including, but not limited to, communities of minority populations or low-income populations, and identify agency outreach to community groups and other affected stakeholders.
>
> (B) Projects must be selected and approved for funding in a publicly noticed meeting."

This *LHI Report* is not intended to be a detailed environmental health impact analysis of proposed projects nor is it intended to substitute for the environmental review conducted during the California Environmental Quality Act (CEQA) review. This *LHI Report* includes staff application of the Environmental Justice Screening Method (EJSM) to identify projects located in areas with social vulnerability indicators and the greatest exposure to air pollution and associated health risks.[7]

The EJSM was developed to identify low-income communities highly affected by air pollution for assessing the impacts of climate change regulations, specifically Assembly Bill 32 (Núñez, Chapter 488, Statutes of 2006), the California Global Warming Solutions Act of 2006. The EJSM integrates data on (i.) exposure to air pollution, (ii.) cancer risk, (iii.) ozone concentration, (iv.) frequency of high ozone days, (v.) race/ethnicity, (vi.) poverty level, (vii.) home ownership, (viii.) median household value, (ix.) educational attainment, and (x.) sensitive populations (populations under 5 years of age or over 65 years of age).

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7 California Air Resources Board (ARB). *Air Pollution and Environmental Justice, Integrating Indicators of Cumulative Impact and Socio-Economic Vulnerability Into Regulatory Decision-Making, 2010.* (Sacramento, California) Contract authors: Manuel Pastor Jr., Ph.D., Rachel Morello-Frosch, Ph.D., and James Sadd, Ph.D.

To determine high risk communities, environmental justice (EJ) indicators for locations of the biofuels early and precommercial technology development projects are compared to data from the U.S. Census Bureau or other public agency. Staff identifies high-risk communities by using a two-part standard. For a community to be considered high- risk, for this assessment, it must meet both Parts 1 and 2 of this standard.

Part 1:

- Communities located in nonattainment air basins for ozone, PM 10 or PM 2.5

Part 2:

- Communities having more than one of the following EJ indicators: (1) minority, (2) poverty, (3) unemployment and/or (4) high percentage of population under 5 years of age and over 65 years of age. The EJ indicators follow:

    - A minority subset represents more than 30 percent of a given city's population. (MINORITY)

    - A city's poverty level exceeds California's poverty level. (POVERTY)

    - A city's unemployment rate exceeds California's unemployment rate. (UNEMPLOYMENT)

    - The percentage of people living in that city are younger than 5 years of age or older than 65 years of age is 20 percent higher than the average percentage of persons under 5 years of age or over 65 years of age for all of California. (SENSITIVE POPULATIONS – AGE)